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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/811,161	03/26/2004	Manish Sinha	GP-303576	1978

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EXAMINER	
WALKER, KEITH D	
ART UNIT	PAPER NUMBER
1795	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/811,161	SINHA ET AL.	
	Examiner	Art Unit	
	KEITH WALKER	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 December 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) *16-22* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Petition

The Petition of 10/12/09 was granted in the decision of 12/16/09. In the Petition of 10/12/09, applicant states that the Examiner indicated that claims 6-9, 14 and 15 are patentable over the cited prior art; however, the patentability for the cited claims was never indicated.

In the decision dated 12/16/09, the choices of sending out a new office action with a signature from a Supervisory Patent Examiner, reinstating the appeal or passing the application to issue were provided. Upon reevaluation of the application, the following new office action is presented with the appropriate signatures.

Claims 1-15 are pending examination and are rejected for the reasons set forth below.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

1. Claims 1-15 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The limitations drawn to the power conditioning module, the controller and

the load following algorithm are elements not described in the instant specification in a manner that enables one skilled in the art to make or use the invention. The amount of direction provided by the inventor is lacking description such that one of ordinary skill in the art would be able to make or use the claimed invention. The claimed invention hinges on a controller and an algorithm and a presence of working examples is lacking to provide guidance as how one would extrapolate the broad claim into a viable invention. While a lack of examples alone does not show lack of enablement, this factor along with the lack of guidance and direction for how to make the algorithm or what components are envisioned for power condition module and the fuel cell controller, together provide evidence as to the question of enablement.

For example, the power conditioning module is illustrated in figure 2 as a general block and is described as a device that includes a DC/DC converter, a DC/AC converter and a battery. However, the power conditioning module also receives signals from the controller and knows how to draw current. What are the elements that perform these functions and how do they operate? How is the power conditioning module responsive to the draw current and the battery current? In other words what makes the module responsive other than it performing the basic function of converting the DC voltage to AC voltage as any DC/AC converter does. The instant disclosure does not describe how the elements are adapted to perform in the particular system with only a reasonable amount of experimentation (MPEP 2164.06(a)).

Regarding the controller, what elements or device constitute the controller? Instant figure 2 shows the fuel cell controller as a block. However, the specification

provides no examples that illustrate an enabling description of what components create the controller and no indication as to “whether the parts represented by the boxes were ‘off the shelf’ parts or must be specifically constructed or modified.” (MPEP 2164.06(a) & 2164.06(c)). When the controller increases the available output power based on the battery current, how does this new available output power relate to the approach and diverge thresholds and how is the load following algorithm affected or involved with the new available output power?

Regarding the "load following algorithm", the instant disclosure provides no method or means for the operation of the algorithm. Missing from the specification is any direction or suggestion as to what structure performs or runs the algorithm and how is the result of the algorithm translated to the other components of the system? Furthermore, no actual algorithm is presented in the instant disclosure. The graph of instant figure 3 shows the function that is performed but not the algorithm by which the function is performed. The graph does not allow one of ordinary skill in the art to realize the intended algorithm or provide the steps required to translate the function into an algorithm for an unknown controlling component. The instant disclosure also does not describe the parameters that go into the algorithm. What determines the approach threshold and the diverge threshold? How are these values calculated and what parameters are used to evaluate if the correct thresholds have been determined? While the fuel is controlled by the load following algorithm, what controls the oxidant? What factors constitute the maximum draw current I_maxFC and how does the load following algorithm define the maximum draw current signal?

The claimed invention and the instant description only provide the end function of an algorithm and not the algorithm or the device that performs the unspecified algorithm.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 7 & 14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The limitations drawn to the fuel cell controller increasing the available output current if the battery sensor measures a predetermined battery current for a predetermined period of time is indefinite because it is unclear how this function works and fits in with the function of the algorithm. Since the battery sensor is always measuring the battery current, then the battery current is always measuring a predetermined current for a predetermined period of time and so the fuel cell controller is always increasing the available output of current. So if the fuel cell's available output is always being increased, how does the fuel cell controller respond to the fuel cell signal and operate the load following algorithm?

Claim Interpretation

The claims are drawn to a fuel cell distribution system, which is an apparatus. The fuel cell system comprises a controller that operates an algorithm. As discussed above, the controller is an unspecified device and the algorithm is both unspecified and

the manner of its operation is also unspecified. An apparatus is defined by its structural limitations and the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from the prior art (MPEP 2114). The courts have held that "a general computer programmed to carry out a particular algorithm crates a 'new machine' because a general purpose computer 'in effect becomes a special purpose computer once it is programmed to perform particular functions pursuant to instructions from the program software.'" (Precedential opinion Ex Parte Catlin, Appeal 2007-3072). However, as noted above, no computer or algorithm is claimed or described in the instant specification and so no 'new machine' is created. As such, the operation of the apparatus is equivalent to the intended use of the apparatus and so while considered will not be given patentable weight.

Claim Rejections - 35 USC § 102/103

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-5 & 10-13 are rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over US 2001/0049038 (Dickman).

Dickman teaches a fuel cell system with a power conditioning module (DC-DC converter) that applies conditioned current to a load. The power conditioning module is responsive to the draw current by using a fuel cell sensor to measure the draw current and the fuel cell voltage and generating a fuel cell signal that reports the fuel cell's current to the fuel cell controller, which is part of the control system (Abstract; Fig. 10; [0046, 0048, 0049, 0057, 0060 & 0064]). The controller sets the available output power from the fuel cell and defines the maximum current drawn from the fuel cell through the power conditioning module using communication links ([0034, 0035, 0040 & 0041]). As the upper threshold of the available power of the operating fuel cell stacks is reached, the controller increases the available power by increasing the number of operating fuel cells. When the power demand decreases below a lower threshold, the available power is decreased by reducing the number of operating fuel cells ([0046, 0051 & 0067]). In light of this teaching, it is implicit that when the draw power from the load does not increase over what the operating fuel cells can provide and does not decrease below what fewer fuel cells could provide, the available output power stays constant. Alternatively, it would be obvious to maintain the output power constant when the load does not vary.

Claims 10-12 are not further limiting to the apparatus since the claims are drawn to the intended use of the apparatus. It is held that a recitation with respect to the

manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from the prior art apparatus satisfying the claimed structural limitations (MPEP 2114). Furthermore, the fuel cell system has an intended use in a motor vehicle ([0032]).

4. Claims 1-5 & 10-13 are rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over US 2002/0082785 (Jones).

Jones teaches a fuel cell system comprising a fuel cell, a battery, a controller (60) and current and voltage sensors (40, 49). The fuel cell controller uses an algorithm to control the operation the fuel cell system (Fig. 1; Abstract, [0018, 0021, 0022, 0024, 0027 & 0028]). The voltage and current sensors inform the controller of the output voltage and current from the fuel cell as required by the load. A power conditioning module converts the fuel cell output into AC voltage and supplies the power to a load ([0052]). The controller increases the available power output when an approach threshold is reached and maintains a constant power when the required power is not longer near the approach threshold. In a similar manner power is decreased when a diverge threshold is reached and then a constant power is maintained when the required power is no longer near the diverge threshold ([0029-0038]). The maximum current draw and available output power are set by the number of fuel cells in the stack and the available reactants flowing to the cells.

Claims 10-12 are not further limiting to the apparatus since the claims drawn to the intended use of the apparatus. It is held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from the prior art apparatus satisfying the claimed structural limitations (MPEP 2114).

Claim Rejections - 35 USC § 103

5. Alternatively, in light of the use claims having patentable weight, claims 1-5 & 10-13 are rejected under 35 U.S.C. 103(a) as obvious over US 2002/0082785 (Jones) in view of US 5,637,414 (Inoue).

The teachings of Jones as discussed above are incorporated herein.

Jones is silent to the controller setting a maximum draw current signal to the power conditioning module.

Inoue teaches a fuel cell system with a method of controlling the fuel cell system. The method of controlling the system includes a controller that communicates with a power conditioning module to evaluate and set the maximum available power output for the fuel cell (Abstract). A command signal from the controller to the power conditioning module sets the maximum available draw current that can be drawn from the fuel cell (Fig. 1; 2:25-3:30, 4:35-5:45). This controlling method prevents the deterioration of the fuel cell performance caused by gas shortages.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the control system with the load following

algorithm of Jones with the method of controlling the power conditioning module to ensure the performance of the fuel cell system is not compromised by a fuel gas shortage.

6. Claims 6-9 & 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2001/0049038 (Dickman) in view of *Power Control Strategy for Fuel Cell Hybrid Electric Vehicles* (Jung).

The teachings of Dickman as discussed above are incorporated herein.

Dickman teaches a power management scheme with a battery assembly ([0048]). However, Dickman is silent to a battery voltage detector or battery current detector.

Jung teaches a method of controlling a fuel cell and battery system for a vehicle (Abstract). The fuel cell and the battery are electrically connected to distribute power to the load. A controller controls the power distribution and uses power from the fuel cell to recharge the battery when required (pg. 1, para. 4 & 5; pg. 2, para. 1 & 5; Fig.3). The battery power can be controlled by regulating the output current according to the output voltage. It is implicit or obvious to one of ordinary skill in the art that a teaching of regulating the current and the voltage is an implicit teaching of a current and voltage sensor that measures these values. Alternatively, it would be obvious to one skilled in the art to understand that monitoring the battery's state of charge (SOC) and regulating the current and voltage to use a current and voltage sensor. The SOC controller monitors either the voltage or the current of the battery (Fig. 5 & 7; Abstract; pg. 3, para.

2-5). While the fuel cell is operating the motor, if the battery requires charging, the controller sends the extra power to the battery to recharge the battery (Fig. 3c; pg. 2). Since SOC controller determines the battery current or voltage is below a predetermined limit for some amount of time, the available power produced by the fuel cell is increased above what is required by the motor.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the battery assembly of Dickman with the current and voltage sensors and controller system taught by Jung to increase the system efficiency (Abstract).

7. Claims 6-9 & 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2002/0082785 (Jones) in view of US 5,637,414 (Inoue) and further in view of *Power Control Strategy for Fuel Cell Hybrid Electric Vehicles* (Jung).

The teachings of Jones and Inoue as discussed above are incorporated herein.

Jones teaches a power management scheme with a battery assembly ([0048]). However, Jones is silent to a battery voltage detector or battery current detector.

Jung teaches a method of controlling a fuel cell and battery system for a vehicle (Abstract). The fuel cell and the battery are electrically connected to distribute power to the load. A controller controls the power distribution and uses power from the fuel cell to recharge the battery when required (pg. 1, para. 4 & 5; pg. 2, para. 1 & 5; Fig.3). The battery power can be controlled by regulating the output current according to the output voltage. It is implicit or obvious to one of ordinary skill in the art that a teaching of

regulating the current and the voltage is an implicit teaching of a current and voltage sensor that measures these values. Alternatively, it would be obvious to one skilled in the art to understand that monitoring the battery's state of charge (SOC) and regulating the current and voltage to use a current and voltage sensor. The SOC controller monitors either the voltage or the current of the battery (Fig. 5 & 7; Abstract; pg. 3, para. 2-5). While the fuel cell is operating the motor, if the battery requires charging, the controller sends the extra power to the battery to recharge the battery (Fig. 3c; pg. 2). Since SOC controller determines the battery current or voltage is below a predetermined limit for some amount of time, the available power produced by the fuel cell is increased above what is required by the motor.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the battery assembly of Jones with the current and voltage sensors and controller system taught by Jung to increase the system efficiency (Abstract).

8. Claims 6-9 & 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2001/0049038 (Dickman) in view of US 4,839,574 (Takabayashi).

The teachings of Dickman as discussed above are incorporated herein.

Dickman teaches a power management scheme with a battery assembly ([0048]). However, Dickman is silent to a battery voltage detector or battery current detector.

Takabayashi teaches a method of controlling the power distribution a fuel cell system that includes a battery. The power output of the fuel cell is increased in response to the battery voltage or current measurements (Abstract, 1:65-2:15). The controller measures and monitors the battery current and when a predetermined battery current is measured for a predetermined period of time, the fuel cell power output is increased (Figs. 1 & 2; 3:45-60, 4:25-50). Instead of using the current as an indicating means, the battery voltage can be used (5:30-60). Increasing the fuel cell output in response to the current and voltage readings allows for a stable supply of output and extends the life of the battery (6:35-50).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the battery system of Dickman with the battery and fuel cell controlling means as taught by Takabayashi to increase the battery life.

9. Claims 6-9 & 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2002/0082785 (Jones) in view of US 4,839,574 (Takabayashi).

The teachings of Jones as discussed above are incorporated herein.

Jones teaches a power management scheme with a battery assembly ([0048]). However, Jones is silent to a battery voltage detector or battery current detector.

Takabayashi teaches a method of controlling the power distribution a fuel cell system that includes a battery. The power output of the fuel cell is increased in response to the battery voltage or current measurements (Abstract, 1:65-2:15). The

controller measures and monitors the battery current and when a predetermined battery current is measured for a predetermined period of time, the fuel cell power output is increased (Figs. 1 & 2; 3:45-60, 4:25-50). Instead of using the current as an indicating means, the battery voltage can be used (5:30-60). Increasing the fuel cell output in response to the current and voltage readings allows for a stable supply of output and extends the life of the battery (6:35-50).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the battery system of Dickman with the battery and fuel cell controlling means as taught by Takabayashi to increase the battery life.

Response to Arguments

Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection. As discussed above, upon reconsideration of the claimed invention, new rejections have been formulated and are expressed above. So the arguments presented by applicant are moot.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEITH WALKER whose telephone number is (571)272-3458. The examiner can normally be reached on Mon. - Fri. 8am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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